

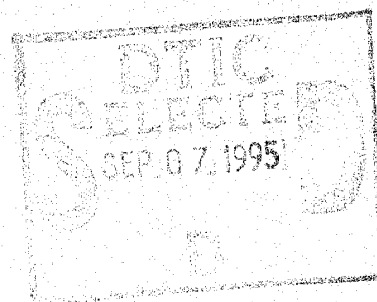
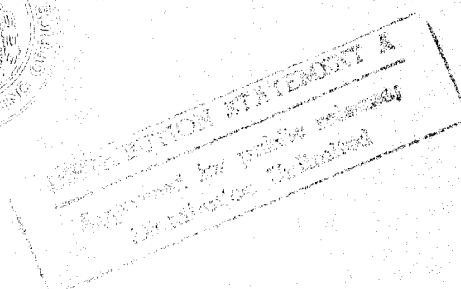
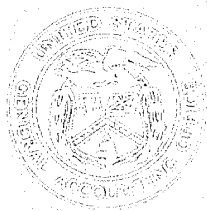


Report to the Chairman, Committee on  
Public Works and Transportation, House  
of Representatives

June 1992

# WATER POLLUTION

## Pollutant Trading Could Reduce Compliance Costs If Uncertainties Are Resolved



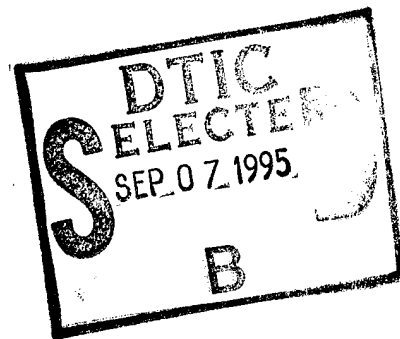
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Resources, Community, and  
Economic Development Division

B-247972.2

June 15, 1992

The Honorable Robert A. Roe  
Chairman, Committee on Public  
Works and Transportation  
House of Representatives



Dear Mr. Chairman:

Pollutant trading has been touted within and outside the Environmental Protection Agency (EPA) as an economical supplement to traditional regulatory programs designed to address water pollution problems. Pollutant trading uses cost savings as an incentive for dischargers to reduce pollution. Under this approach, dischargers of pollution help determine (with EPA or state assistance and approval) how their collective discharges can be reduced to preapproved levels in a cost-effective manner. Within these bounds, pollutant trades can take place among dischargers of point source pollution (such as effluent from industrial facilities or municipal sewage treatment plants) or between dischargers of point and nonpoint source pollution (such as runoff from farms or construction sites).

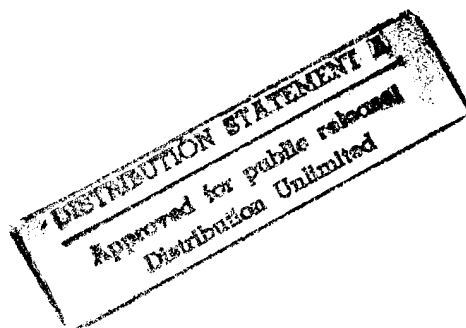
This letter responds to your request for information on the use of pollutant trading as a cost-effective method of dealing with some of the nation's remaining water quality problems. As agreed with your office, this report discusses (1) projects that are using pollutant trading to help solve water quality problems at a particular watershed area or body of water, (2) potential barriers that may impede the wider use of pollutant trading, and (3) EPA's efforts to implement a nationwide trading program. Also, as agreed with your office, this report discusses whether statutory or administrative changes to make trading more viable are warranted.

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## Results in Brief

Pollutant trading to control water pollution has thus far been confined to four projects nationwide. Only one trade has actually been made so far, and all but one of the projects involve trading between point and nonpoint pollution sources. Although each of the projects varies considerably, they were all initiated by local communities searching for a way to address water pollution problems while reducing pollution control costs.

The limited activity in pollutant trading nationwide can be largely attributed to uncertainties surrounding its use. Some in the regulatory and



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regulated communities are hesitant to establish trades because although the authority to conduct trades is implied in the Clean Water Act, they fear that the act's lack of explicit authority for trading could result in legal challenges to projects. Questions have also surfaced about how to administer, monitor, and enforce trades. Nevertheless, many of these issues are not unique to trading programs. In particular, adequate monitoring data and effective enforcement mechanisms would also be needed under more traditional regulatory programs aimed at controlling nonpoint source pollution.

EPA recognizes pollutant trading's potential to help address water pollution problems and has started to address some of the barriers that impede the wider use of trading. For example, EPA recently sponsored a 2-day conference on trading, has identified over 900 water bodies with trading potential, and is preparing a series of papers that examine the merits and limitations of trading and other market-based incentives. EPA is also considering guidance for communities that wish to initiate their own trading projects. However, agency officials acknowledge that the guidance could be more detailed and specific if more were known about how trading can be used and implemented.

Pollutant trading is not a panacea for all of the nation's water quality problems, nor is it applicable in all situations. However, in certain circumstances it could serve as a cost-effective supplement to more traditional water pollution regulatory programs. EPA could play a valuable role in demonstrating this potential by helping to establish projects for some of the water bodies it has identified as possible candidates for trading. These projects could help the agency resolve many of the questions surrounding trading's use. If the Congress wishes to see trading employed on a wider basis, it may want to address the concerns that some have raised about trading's legal status. This could be accomplished by amending the Clean Water Act to explicitly authorize trading.

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## Background

Since the Clean Water Act was passed in 1972, surface water pollution programs have largely focused on point sources of water pollution, such as sewage treatment plants or manufacturing facilities. Under the act, EPA or delegated states issue permits that limit the pollutant levels that these facilities can discharge into the nation's surface waters. Although this permit process has yielded significant gains in water quality, the process does not address pollution from diffuse, or nonpoint, sources of water pollution, such as urban or agricultural runoff. As we noted in our October

1990 report on nonpoint pollution,<sup>1</sup> the nation's remaining water quality problems are largely attributable to pollution from nonpoint sources. Although 1987 amendments to the act placed additional emphasis on nonpoint sources of water pollution, the diversity and pervasiveness of nonpoint source pollution, coupled with the political sensitivity of regulating land use activities, continues to present an enormous technical and regulatory challenge for state and local governments.

Over the past decade, pollutant trading has been suggested as an economical means to address some of the nation's remaining pollution problems. Recent amendments to the Clean Air Act, for example, specifically authorize air emissions trading. Trading's potential to reduce the cost of meeting point and nonpoint source water pollution standards has also received increasing attention in recent years. Under such a trading scheme, dischargers faced with differing costs for meeting pollution limits could arrange among themselves (with EPA or state assistance) how best to allocate the reduction of their total discharges, while decreasing their costs of meeting the limits.

For example, instead of the need for two sewage treatment plants to install additional equipment to reduce their discharges, one treatment plant could help finance the other's installation of additional, sophisticated treatment equipment if such an arrangement would yield equivalent (or better) reductions at lower costs. Trades could also be made between point and nonpoint sources. For example, instead of installing additional treatment equipment to reduce its discharge of nutrients, a sewage treatment plant could pay farmers to use management practices that would better control the runoff of nutrients from fertilizers or livestock wastes. In either case, the terms of the trade would then be approved by EPA or the state and reflected in the discharge permits.

## Few Trading Projects Have Thus Far Been Initiated

On the basis of our literature review and discussions with EPA officials, we identified the following four projects in which trading is a component of a plan to address water pollution.<sup>2</sup> These projects were initiated by local groups who were searching for a means to avoid additional—and increasingly expensive—restrictions on point source dischargers. At three locations, the projects provide for trading between point and nonpoint sources as part of a strategy to control phosphorus and other nutrients

<sup>1</sup>Water Pollution: Greater EPA Leadership Needed to Reduce Nonpoint Source Pollution (GAO/RCED-91-10, Oct. 15, 1990).

<sup>2</sup>Appendix I contains more detailed information on these four projects.

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that impair water quality. The fourth project permits the trading of discharge allocations between point sources.

- Dillon Reservoir, Colorado. In 1984 the state of Colorado and EPA approved a trading program for the Dillon Reservoir to control nonpoint sources of phosphorus. In the only trade nationwide to date, a sewage treatment authority received an 11-pound credit on its discharge permit for 22 pounds of phosphorus removed from nonpoint sources when the authority installed sewers in a small development that had been using septic tanks. Incentives for additional trades were temporarily eliminated because treatment plants have improved their operating efficiencies, which substantially reduced phosphorus discharges into the reservoir.
- Cherry Creek Reservoir, Colorado. Representatives from the county, local communities, and water and sanitation districts surrounding the reservoir formed a trading authority to help address phosphorus pollution from nonpoint sources. After authority members achieve a 50-percent reduction of annual phosphorus loadings from nonpoint sources, they may make excess reductions available to sewage treatment plants in the form of a pollution credit. Trading will likely be delayed because anticipated land development has not materialized and treatment plants are operating well within their phosphorus load allocations.
- Tar-Pamlico River Basin, North Carolina. The state established a total, allowable discharge level for the basin. The state approved a strategy whereby an association of sewage treatment plants can meet this level either by making modifications to their facilities and/or by making a monetary contribution to a voluntary state program that helps farmers reduce nonpoint source pollution. Contributions to this program will begin in September 1992.
- Fox River, Wisconsin. In 1981 the state of Wisconsin initiated a trading program for the point source dischargers along the river. Under the program, the state established a total pollutant discharge goal, imposed more stringent limits among individual dischargers, and allowed dischargers—under limited circumstances—to trade the equivalent of discharge limits among themselves. No trades have taken place to date. According to EPA and state officials, excessive program restrictions (e.g., trades cannot be justified on cost savings alone) have largely eliminated the economic incentives for trading.

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## Impediments to the Wider Use of Pollutant Trading

The limited use of pollutant trading to achieve water quality goals can largely be attributed to concerns surrounding (1) trading's legal status under the Clean Water Act and (2) the complexities involved in designing and implementing a workable trading system.

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## The Clean Water Act Does Not Explicitly Authorize Trading

Unlike the Clean Air Act, the Clean Water Act does not explicitly authorize the use of pollutant trading. However, the act contains provisions that suggest that trading is allowed, at least to some extent. Specifically, the act establishes a process for determining the maximum amount of a pollutant that can enter a water body without violating water quality standards—referred to as the total maximum daily load (TMDL) process. Under this process, states allocate pollutant waste loads among point and nonpoint sources. EPA's regulations on TMDLs provide that if the nonpoint source pollution controls make more stringent nonpoint allocations practicable, then allocations for point sources can be made less stringent. In this regard, the regulations state that "... the TMDL process provides for nonpoint source control tradeoffs."<sup>3</sup> In addition, the Clean Water Act encourages EPA to help states develop techniques for controlling nonpoint source pollution—including innovative methods, practices, and regulatory programs. According to an EPA analysis of pollutant trading under the Clean Water Act, an argument can be made that such programs include pollutant trading.

Nevertheless, EPA attributes the low level of pollutant trading, in part, to the absence of a clear and unambiguous authorization of trading in the Clean Water Act. In particular, EPA's analysis of trading states that the absence of explicit authorization inhibits trading because of perceived legal risks that programs will be overturned or disallowed by regulators or the courts. Although the analysis does not contain recommendations, it concludes that there are benefits in amending the act to more clearly signal that trading is permissible.

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## Questions Remain About How to Design and Implement Trades

Other key questions center around how to (1) create institutional structures to facilitate trading, (2) obtain adequate data to establish and monitor compliance with terms of the trades, and (3) establish effective enforcement mechanisms to ensure that the terms of the trades are followed.

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## Creating Institutional Structures

Although trades are intended to take place between dischargers with minimal regulatory interference, some organization must be in place to

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<sup>3</sup>40 C.F.R. 130.2(i).

help design, approve, and administer the trades. As was the case in the Dillon Reservoir and Cherry Creek projects, the organization might include representatives from the state, counties, and local communities and from water and sanitation districts neighboring the water body. It might also be useful to have others represented that could facilitate trades, such as individuals from agricultural extension programs, the Soil and Conservation Service, and environmental organizations. In addition, proposed trades would have to be approved by a regulatory entity that may or may not be part of the trading project's organization. While the formation of such an organization is not a formidable task, it does entail a commitment of time and resources that needs to be taken into account when involved parties design trades.

#### Obtaining Adequate Data

Adequate data constitute a critical component of an effective trading program. Data on pollution types, levels, and sources are needed to determine (1) whether a trading program is needed and viable, (2) who and what pollutants should be involved in the trade, (3) what the trade's effect will be on the water body, and (4) whether the terms of the trade are being complied with. Although the need for monitoring data is not unique to trading programs, the data are a necessary component whose absence can impede the wider use of trading.

As we noted in our October 1990 report on nonpoint source pollution, obtaining data on this type of pollution is especially problematic and costly because the sources are diffuse and the pollution from these sources can be episodic. Project officials have been able to offset this problem, to some degree, by ensuring that any trades clearly result in water quality improvements. Under the Dillon Reservoir project, for example, point source dischargers earn 1 pound of credit on their permits for every 2 pounds of phosphorus removed through a nonpoint source control. Although the main purpose of the 2-for-1 credit is to help address new nonpoint source runoff from recent development and growth, this approach also provides a margin of safety to offset the uncertainty surrounding the monitoring data's ability to measure the effectiveness of nonpoint source controls.

#### Developing Enforcement Mechanisms

Finally, questions have been raised about how to establish an effective enforcement mechanism to ensure that the terms of the trade are complied with. As we have reported in the past, enforcement is a critical component of an effective regulatory program.<sup>4</sup> Although pollutant trading

<sup>4</sup>For example, see our testimony entitled Water Pollution: Observations on Compliance and Enforcement Activities Under the Clean Water Act (GAO/RCED-91-80, July 18, 1991).

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differs from traditional regulatory programs in many respects, most observers agree that effective enforcement mechanisms are also needed under a trading program.

Many of the concerns raised about enforcement under a trading program would also need to be addressed under more traditional regulatory programs aimed at controlling nonpoint source pollution. A primary example is the concern discussed above regarding the adequacy of monitoring data. Poor monitoring data make it difficult to determine if the generator of nonpoint source pollution is complying with the terms of the trade or other program requirements. The absence of this information could eliminate the viability of an enforcement program.

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## EPA Is Beginning to Address the Barriers to Trading

Although EPA has examined some of the benefits and limitations of pollutant trading since the early 1980s, the agency has only recently started to address the barriers to pollutant trading and to more actively promote its wider use. As discussed above, the few trading projects in existence were initiated by local communities searching for a more cost-effective approach to achieve water quality goals. EPA's involvement in these projects has largely been limited to providing technical and/or financial assistance. For example, EPA discussed trading options with project officials in some cases and in other cases provided some financial assistance to help identify existing problems and to test various nonpoint source pollution controls.

EPA has recently expanded its efforts to explore pollutant trading's potential and plans to increase its assistance to others interested in using trading as a tool to improve water quality. For example, the agency hosted a 2-day conference in April 1992 to promote point/nonpoint trading within federal, state, and local water quality programs. In addition, EPA is currently preparing a series of papers that examine the merits and limitations of pollutant trading and other market-based approaches, including effluent discharge fees, incentives for early reductions of toxic pollutants, and wetlands mitigation banking.

To date, EPA has completed a paper on pollutant trading between point and nonpoint sources. While the paper outlines many of the limitations of pollutant trading, it also identifies nearly 950 water bodies with the potential for trading projects for nutrients alone. However, the paper points out that, at least in the near-term, trading projects are likely to be implemented in only a portion of this group.



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The paper also outlines a number of possible actions that EPA could take to ease the implementation of trading programs. These actions include providing guidance, technical and financial assistance, and explicit approval of trading as agency policy. Although EPA is considering drafting guidance for communities that wish to initiate their own pollutant trading projects, EPA officials told us that the number and variety of uncertainties surrounding trading have hindered this effort. According to these officials, the uncertainties make it difficult for the agency to issue detailed, specific guidance to help those considering implementing a trading project.

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## Conclusions

Although significant progress has been made in the past two decades, innovative and cost-effective approaches are needed to help address the nation's remaining water quality problems. Pollutant trading is one such approach with potential as a supplement to traditional regulatory programs. While EPA is beginning to address some of the barriers to pollutant trading, a number of questions and concerns need to be resolved before trading's potential as a supplement to existing regulatory programs can be demonstrated.

EPA can play a valuable role in this effort by helping others institute projects for a portion of the nearly 950 water bodies it identified as having trading potential. These projects could be specifically designed to test alternative approaches to deal with many of the questions and concerns that have been raised about trading. EPA then could share the "lessons learned" from these demonstration projects by providing detailed, specific guidance to others considering implementing a trading project. If the Congress wishes to see trading employed on a wider basis, it may want to address the concerns that some have raised about trading's legal status. This could be accomplished by amending the Clean Water Act to explicitly authorize trading under the act.

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## Recommendations

To help resolve some of the remaining questions and concerns surrounding pollutant trading, we recommend that the Administrator, EPA, assist others in initiating demonstration projects specifically designed to test alternative approaches to pollutant trading. EPA should then develop detailed and specific guidance—based in part on these demonstration projects—to help others considering implementing trading projects.

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## Matter for Congressional Consideration

If the Congress wishes to see trading employed on a wider basis, it may want to address the concerns that some have raised about trading's legal status under the Clean Water Act. This could be accomplished by amending the act to explicitly authorize trading.

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## Agency Comments

We discussed the facts in this report with officials in EPA's Office of Water and Office of Policy, Planning, and Evaluation. They generally agreed with the facts we presented. The officials stated that the report was an informative and balanced presentation of the issues involved with pollutant trading but should more clearly state that (1) trading is a supplement, rather than an alternative, to traditional regulatory programs and (2) many of the issues raised are not unique to trading programs and would also need to be addressed under more traditional regulatory approaches aimed at controlling nonpoint source pollution. We incorporated these and other comments where appropriate. As requested, we did not obtain formal written comments from EPA on a draft of this report.

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## Scope and Methodology

We interviewed officials in EPA's Office of Water; Office of Policy, Planning, and Evaluation; and all 10 of EPA's regional offices. On the basis of these discussions and our literature review, we identified four projects in which pollutant trading has occurred or has been proposed. We then visited these four projects—the Dillon and Cherry Creek reservoirs in Colorado, the Tar-Pamlico River basin in North Carolina, and the Fox River in Wisconsin—and interviewed local, state, and EPA regional officials about project development and implementation. We also discussed pollutant trading with other interested parties, including the Natural Resources Defense Council and the Association of Metropolitan Sewerage Agencies. Our work was performed between October 1991 and April 1992 in accordance with generally accepted government auditing standards.

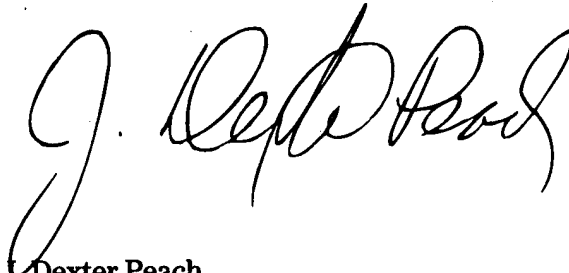
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As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of this letter. At that time, we will send copies to the appropriate congressional committees; the Administrator, EPA; the Director, Office of Management and Budget; and other interested parties. This work was performed under the direction of Richard L. Hembra, Director, Environmental Protection Issues, who can be reached on (202) 275-6111 if

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you or your staff have any questions. Major contributors to this report are listed in appendix II.

Sincerely yours,

A handwritten signature in black ink, appearing to read "J. Dexter Peach". The signature is fluid and cursive, with the first letter "J" being particularly large and stylized.

J. Dexter Peach  
Assistant Comptroller General



# Trading Projects

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The following provides additional details concerning the four pollutant trading projects visited during the course of our review.

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## Dillon Reservoir, Colorado

In 1984 the state of Colorado and EPA approved a trading program for the Dillon Reservoir to control nonpoint sources of phosphorus. This program constitutes the only trade nationwide to date. Under the program, sewage treatment authorities pay for the installation of nonpoint source controls and receive credit in their discharge permits of 1 pound for every 2 pounds of phosphorus removed from nonpoint sources. Sewage treatment authorities have the option of either implementing the nonpoint source controls (e.g., installing sewer lines to replace septic tanks) or paying other generators of the pollution, such as land developers, to do so.

In addition, developers may earn credits by installing nonpoint pollution controls themselves. The developers may then offer these credits to a sewage treatment authority. By doing so, the authority can avoid costly new facility improvements that would otherwise be needed to accommodate new development and whose cost would ultimately be passed on to the developer and its customers.<sup>1</sup> The treatment authorities are responsible for ensuring that the nonpoint source controls used in a trade are implemented. Their discharge permits must contain operation and maintenance requirements for the nonpoint source controls as well as monitoring and reporting requirements so that the effectiveness of the controls can be assessed.

A sewage treatment authority received an 11-pound credit on its discharge permit for 22 pounds of phosphorus removed from nonpoint sources when the authority installed sewers in a small development that had been using septic tanks. Incentives for additional trades were eliminated because population growth slowed and the treatment plants significantly improved the operating efficiency of their existing treatment equipment. These two factors substantially reduced phosphorous discharges into the reservoir and, for the present, have greatly reduced the need for point/nonpoint source trades.

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## Cherry Creek Reservoir, Colorado

Under this project, the trading authority consists of representatives from the county, local communities, and water and sanitation districts surrounding the reservoir. Because of the magnitude of pollution from

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<sup>1</sup>Trading credits are allowed only for the control of "old" nonpoint sources that existed before 1984—the year that Colorado approved the trading plan. New sources of nonpoint pollution are controlled through local regulations such as grading and excavation restrictions.

nonpoint sources—an estimated 85 percent of the total phosphorous pollutants—authority members adopted nonpoint source “best management practices,” such as storm water and erosion controls. Once these controls achieve a 50-percent reduction in the annual phosphorous load from nonpoint sources, the trading authority may make any excess reduction available to sewage treatment plants in the form of a pollution credit. Additional phosphorous credits will be available as a result of nonpoint source projects implemented by the authority and financed by the proceeds from member assessments, a reservoir user fee, and other fees and taxes.

As of January 1992 project officials believed that the initial 50-percent reduction goal had been achieved, but they were awaiting the collection of monitoring data to make a final determination. In any case, it appears that any trading will be delayed because the situation that prompted the development of the trading strategy—rapid growth and development pressures on treatment plant discharges—did not materialize and treatment plants are operating well within their phosphorous load allocations. However, the trading arrangement may be implemented if growth significantly increases in the future.

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## Tar-Pamlico River Basin, North Carolina

After the state identified a nutrient problem (nitrogen and phosphorous) in the basin, it recommended a strategy to limit nutrient discharges from a group of point source dischargers. Subsequently, some of the dischargers formed an association and proposed an alternative strategy that included pollutant trading. The strategy, approved by the state, contains a total, allowable discharge level for the association that, in turn, allocates individual discharge limits among its members. If the association's total discharge exceeds the maximum allowed, the excess must be offset with credits obtained through monetary contributions to the state's Agriculture Cost Share Program, a voluntary program that helps farmers pay for best management practices, such as animal waste treatment lagoons, to reduce nonpoint source pollution.

If association members choose to meet all of the nutrient reductions by funding nonpoint source controls rather than reducing their own discharges, they could pay as much as \$11.2 million into the Cost Share Program. The association has paid an additional \$150,000 to fund state administrative support for the Cost Share Program and agreed to pay \$400,000 for an estuarine water quality computer model. EPA awarded a \$500,000 grant to the association to assist in developing the model.

Under the agreement, the treatment plants' responsibility for implementing nonpoint source controls generally ends with the plants' payments into the state fund. However, the agreement includes several safeguards to ensure adequate protection of the basin. For example, the agreement does not preclude the state from requiring individual point sources to remove nutrients where a localized water quality problem exists. In addition, if association members fail to meet any of their requirements, they become subject to the stricter effluent limits that the state planned to impose prior to the development of the trading strategy. The recently revised strategy calls for association members to make an initial contribution to the Cost Share Program in September 1992. Accordingly, association-funded nonpoint source pollution control projects have not been implemented to date.

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## Fox River, Wisconsin

In 1981 the state of Wisconsin initiated a trading program for the point source dischargers—primarily paper mills and sewage treatment plants—along the Fox River. The state initiated the program in an effort to meet water quality standards for biological oxygen-demand pollutants. Under the program, the state (1) established a total waste load goal; (2) imposed more stringent limits on individual dischargers; and (3) under limited conditions, allowed the dischargers to trade the equivalent of discharge limits among themselves.

Proposed trades must be submitted to and approved by the state. To be approved, the increase in discharge levels must be from new production by a new discharger or increased production that could not be accommodated by existing state-of-the-art treatment technology. Trades cannot be justified on cost savings alone. No trades have taken place under the program to date.<sup>2</sup> According to EPA and state officials familiar with the project, these and other program restrictions have largely eliminated economic incentives for trading.

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<sup>2</sup>Two "reallocations" have taken place under the program, however. In one case, a facility had part of its discharge limit allocated to other dischargers after it closed. In the other case, a discharger transferred its allocation to a sewage treatment plant after it ceased directly discharging wastewater into the river and started sending its wastewater to the treatment facility.

# Major Contributors to This Report

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